

Claims Added per PRELIMINARY AMENDMENT A

1 74. A computer system having an extendable computer architecture, comprising,
2 a plurality of clusters, each cluster including,
3 one or more nodes, each node including computer hardware and operating system
4 software for executing jobs,
5 a service unit for executing one or more of said jobs to provide services,
6 a communication unit having communication connections for communicating
7 among clusters,
8 a resource management unit including a load balancing unit for monitoring job
9 loads on nodes within said cluster and for transferring jobs to less taxed
10 nodes in the cluster.

1 75. The computer system of Claim (last) wherein a load balancing unit on one cluster
2 transfers jobs over a communication connection with another one of the clusters to less
3 taxed nodes in the one of said clusters.

1 76. A computer system for a distributed computing environment comprising:
2 multiple clusters of nodes,
3 each cluster having one or more coordinators, said coordinators functioning for
4 routing among nodes using a directory service,
5 means for detecting failure of a coordinator,
6 automatically responding to dynamically reconfigure said distributed computing
7 environment to replace each failed coordinator with another coordinator to
8 maintain directory services in said distributed computing environment.

1 77. A cluster multiprocessing system, comprising:

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a plurality of data processing systems segregated into a plurality of resource groups each including an application and at least two data processing systems;

a plurality of coordinators each corresponding to a resource group within the plurality of resource groups, each coordinator containing:
configuration and status information for the corresponding resource group;
identifying data processing systems within the corresponding resource group;
a configuration database for each coordinator, each configuration database containing configuration information for replication on multiple data processing systems.

78. A method of restarting a node in a clustered computer system, wherein the clustered computer system hosts a group including first and second agents that reside respectively on first and second nodes, the method comprising:
in response to a clustering failure on the first node, notifying the second agent of the group the using the first agent; and
in response to the notification, initiating a restart of the first node using the second agent.

79. A method of restarting a node in a clustered computer system, wherein the clustered computer system hosts a group including first and second members that reside respectively on first and second nodes where the first member is a job and the second member is an agent, the method comprising:
in response to a clustering failure on the first node, notifying the second member of the group using the first member; and
in response to the notification, initiating a restart of the first node using the second

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member.

80. A method of shutting down a node in a clustered computer system, the method comprising:
detecting a failure in a first node among a plurality of nodes in a clustered computer system with a first group member on the first node;
in response to detecting the failure, transmitting a signal to other nodes in the plurality of nodes to indicate the failure on the first node; and
in response to detecting the failure, preemptively terminating a second group member on the first node.

81. A method of accessing a group in a clustered computer system, wherein the clustered computer system includes a plurality of nodes, and wherein the group includes a plurality of members resident respectively on the plurality of nodes, the method comprising:
receiving an access request on a first node in the plurality of nodes, wherein the access request identifies the group; and
processing the access request on the first node to initiate an operation on one or more of the nodes in the group.

82. A method of performing a resource action on a resource in a clustered computer system of the type including a plurality of nodes and a plurality of cluster objects resident on one or more of the plurality of nodes, the method comprising:
modifying a node configuration parameter for one or more of the plurality of nodes, such that any inactive node among the plurality of nodes is thereafter blocked from receiving messages and wherein the messages are redirected to one or more active ones of the nodes through logical-to-physical translations.

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1 83. A method of providing a single system image in a clustered environment comprising:
2 multiple elements each detecting a failure in the clustered environment, one or more of
3 said elements initiating a restart to compensate for said failure, said one or more of said
4 elements each broadcasting that a restart has been initiated, each of said one or more of
5 said elements processing broadcasts from other of one or more of said elements to cause
6 only one of said restarts to persist.

1 84. A system for controlling operation of a plurality of nodes in a network; each respective
2 node of said plurality of nodes hosting at least one respective service; the system
3 responding to any node being inoperative by effecting a restart operation to maintain
4 continuity; said restart operation including distributing said at least one respective service
5 hosted by an node to one or more operating nodes in said network; the system
6 comprising:

7 at least one control unit; said at least one control unit embodied in a node; said at
8 least one control unit being coupled with each said respective node in said
9 network; and

10 at least one control program; said at least one control program being distributed
11 on one or more nodes in said network; one of said at least one control unit
12 and said at least one control program effecting said restart operation to
13 maintain continuity when a node becomes inoperative.

1 85. A method for detecting the restart of liveness daemons in a distributed, multinode data
2 processing system in which nodes communicate liveness indicia in the form of heartbeat
3 signals to each node, said method comprising the steps of: sending, from a first node to
4 other nodes a first message which includes at least indicia of occurrence of a restart; and
5 determining, from said indicia of occurrence of said restart and from locally stored

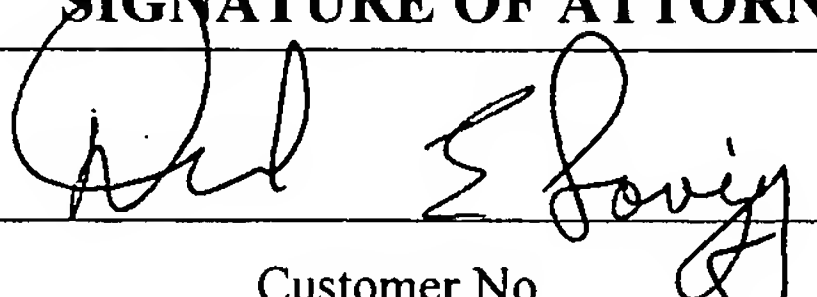
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6 information, the existence of a restart, and responding thereto by sending a second
7 message which indicates that execution on said first node is to be terminated.

1 86. A method of programmatically starting a node in a clustered computer system,
2 comprising: initiating an automated discovery process for discovering a coordinator in the
3 clustered computer system; starting the node in the clustered computer system-under the
4 monitoring of the coordinator.

87. A method for detecting the restart of liveness daemons in a distributed, multinode data
processing system in which nodes communicate liveness indicia in the form of heartbeat
signals to each node, said method comprising the steps of: sending, from a first node to
other nodes a first message which includes at least indicia of occurrence of a restart; and
determining, from said indicia of occurrence of said restart and from locally stored
information, the existence of a restart, and responding thereto by sending a second
message which indicates that execution on said first node is to be terminated.

Respectfully submitted,

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